



SEQUENCE LISTING

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<120> NOVEL TRANSFERASE AND AMYLASE, PROCESS FOR PRODUCING
THE ENZYMES, USE THEREOF, AND GENE CODING FOR THE SAME

<130> 049441/0124

<140> 09/695,423
<141> 2000-10-25

<150> 09/298,924
<151> 1999-04-26

<150> 08/750,569
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<150> JP 7-120673
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<150> JP 6-311185
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<170> PatentIn Ver. 2.1

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Asn His Gly Tyr Asp Val Ile Asp His Ser Arg Ile Asn Asp Glu Leu
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25 30 35
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Gly Leu Gly Ile Ile Gln Asp Ile Val Pro Asn His Met Ala Val Asn
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gaa att aaa aaa gag gta cag att aat gag cta cct agg ata cta gtt Glu Ile Lys Lys Glu Val Gln Ile Asn Glu Leu Pro Arg Ile Leu Val 665	670	675	2849	
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ggactgttaa atcaactttt atgtgaatta tgaaacgtaa attataagtt tcctgaggat aaacatatat atctctatct ctcatgtata tcacatgagt attagattaa ggggaagtaa ttcttacgga cattcaggct ggttacagt atactgtaga atatgtataa ggaaaataag aataggaacg gacttagtct acaaatgccc taaatgtgaa aagaagtata acgcattctt ctgtgaagca gatgcttaggg gattaaagaa aaagtgcggca tactgtggta ctgaacttgt 3025			2965	
			3085	
			3145	
			3205	

cagtgcatt taagactcaa atagaaggta aaaatattt tatactgaat aatgagttgt 3265
tttacgctga tacggatata gttattcgaa atcaagattt tattaagaaa ctcaccttta 3325
cacaatataa taagattgcc tatattgaca tggacataga aacgacagaa tttaagatat 3385
taagattagt agtgtgtaaa actagaataa atatttatgt ttgcaacgta attggtaaat 3445
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<211> 680

<212> PRT

<213> *Sulfolobus acidocaldarius*

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Arg Ile Asn Asp Glu Leu Gly Gly Glu Lys Glu Tyr Arg Arg Arg Leu Ile
20 25 30

Glu Thr Ala His Thr Ile Gly Leu Gly Ile Ile Gln Asp Ile Val Pro
 35 40 45

Asn His Met Ala Val Asn Ser Leu Asn Trp Arg Leu Met Asp Val Leu
50 55 60

Lys Met Gly Lys Lys Ser Lys Tyr Tyr Thr Tyr Phe Asp Phe Phe Pro
65 70 75 80

Glu Asp Asp Lys Ile Arg Leu Pro Ile Leu Gly Glu Asp Leu Asp Thr
85 90 95

Val Ile Ser Lys Gly Leu Leu Lys Ile Val Lys Asp Gly Asp Glu Tyr
 100 105 110

Phe Leu Glu Tyr Phe Lys Trp Lys Leu Pro Leu Thr Glu Val Gly Asn
 115 120 125

Asp Ile Tyr Asp Thr Leu Gln Lys Gln Asn Tyr Thr Leu Met Ser Trp
130 135 140

Lys Asn Pro Pro Ser Tyr Arg Arg Phe Phe Asp Val Asn Thr Leu Ile
 145 150 155 160

Gly Val Asn Val Glu Lys Asp His Val Phe Gln Glu Ser His Ser Lys
165 170 175

Ile Leu Asp Leu Asp Val Asp Gly Tyr Arg Ile Asp His Ile Asp Gly
180 185 190

Leu Tyr Asp Pro Glu Lys Tyr Ile Asn Asp Leu Arg Ser Ile Ile Lys
195 200 205

Asn	Lys	Ile	Ile	Ile	Val	Glu	Lys	Ile	Leu	Gly	Phe	Gln	Glu	Glu	Leu
210					215						220				

Lys Leu Asn Ser Asp Gly Thr Thr Gly Tyr Asp Phe Leu Asn Tyr Ser
 225 230 235 240
 Asn Leu Leu Phe Asn Phe Asn Gln Glu Ile Met Asp Ser Ile Tyr Glu
 245 250 255
 Asn Phe Thr Ala Glu Lys Ile Ser Ile Ser Glu Ser Ile Lys Lys Ile
 260 265 270
 Lys Ala Gln Ile Ile Asp Glu Leu Phe Ser Tyr Glu Val Lys Arg Leu
 275 280 285
 Ala Ser Gln Leu Gly Ile Ser Tyr Asp Ile Leu Arg Asp Tyr Leu Ser
 290 295 300
 Cys Ile Asp Val Tyr Arg Thr Tyr Ala Asn Gln Ile Val Lys Glu Cys
 305 310 315 320
 Asp Lys Thr Asn Glu Ile Glu Glu Ala Thr Lys Arg Asn Pro Glu Ala
 325 330 335
 Tyr Thr Lys Leu Gln Gln Tyr Met Pro Ala Val Tyr Ala Lys Ala Tyr
 340 345 350
 Glu Asp Thr Phe Leu Phe Arg Tyr Asn Arg Leu Ile Ser Ile Asn Glu
 355 360 365
 Val Gly Ser Asp Leu Arg Tyr Tyr Lys Ile Ser Pro Asp Gln Phe His
 370 375 380
 Val Phe Asn Gln Lys Arg Arg Gly Lys Ile Thr Leu Asn Ala Thr Ser
 385 390 395 400
 Thr His Asp Thr Lys Phe Ser Glu Asp Val Arg Met Lys Ile Ser Val
 405 410 415
 Leu Ser Glu Phe Pro Glu Glu Trp Lys Asn Lys Val Glu Glu Trp His
 420 425 430
 Ser Ile Ile Asn Pro Lys Val Ser Arg Asn Asp Glu Tyr Arg Tyr Tyr
 435 440 445
 Gln Val Leu Val Gly Ser Phe Tyr Glu Gly Phe Ser Asn Asp Phe Lys
 450 455 460
 Glu Arg Ile Lys Gln His Met Ile Lys Ser Val Arg Glu Ala Lys Ile
 465 470 475 480
 Asn Thr Ser Trp Arg Asn Gln Asn Lys Glu Tyr Glu Asn Arg Val Met
 485 490 495
 Glu Leu Val Glu Glu Thr Phe Thr Asn Lys Asp Phe Ile Lys Ser Phe
 500 505 510
 Met Lys Phe Glu Ser Lys Ile Arg Arg Ile Gly Met Ile Lys Ser Leu
 515 520 525

Ser Leu Val Ala Leu Lys Ile Met Ser Ala Gly Ile Pro Asp Phe Tyr
 530 535 540
 Gln Gly Thr Glu Ile Trp Arg Tyr Leu Leu Thr Asp Pro Asp Asn Arg
 545 550 555 560
 Val Pro Val Asp Phe Lys Lys Leu His Glu Ile Leu Glu Lys Ser Lys
 565 570 575
 Lys Phe Glu Lys Asn Met Leu Glu Ser Met Asp Asp Gly Arg Ile Lys
 580 585 590
 Met Tyr Leu Thr Tyr Lys Leu Leu Ser Leu Arg Lys Gln Leu Ala Glu
 595 600 605
 Asp Phe Leu Lys Gly Glu Tyr Lys Gly Leu Asp Leu Glu Glu Gly Leu
 610 615 620
 Cys Gly Phe Ile Arg Phe Asn Lys Ile Leu Val Ile Ile Lys Thr Lys
 625 630 635 640
 Gly Ser Val Asn Tyr Lys Leu Lys Leu Glu Glu Gly Ala Ile Tyr Thr
 645 650 655
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 Leu Pro Arg Ile Leu Val Arg Met
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 gcagaggtaa acccatgaat gtcatttcg acgttattaa cgagatccat gggtttttg 180
 gtgcattgtg ggcgggagca gctctactta actacttagt taagcctcaa gataagaggc 240
 aatttggag aatagggaaa ttcttcatga taaactcagt cattacagta ataactggga 300
 taataatttt cgcctacatt tacctagccc cttatcaagg gaatttattt ctagtagcgg 360
 caatttctacg ttcaagcctt gacatttagt taagggcctt actaaactta ataggaggag 420
 cgtttgggtt attggctttt gggcaggga tagttataag caataggata aggcttatgg 480
 tacgtgttaa ggaaggtgac gctacaatcc tagagttgag gaatagtattt gccaatttat 540

ctaaaatttag tttaatcttc ttattacttt ccttagccat gatgatactt gctggttcca 600
 tagcacaagt tataagttag agttgaaaga aaaattta atg acg ttt gct tat aaa 656
 Met Thr Phe Ala Tyr Lys
 1 5

ata gat gga aat gag gta atc ttt acc tta tgg gca cct tat caa aag 704
 Ile Asp Gly Asn Glu Val Ile Phe Thr Leu Trp Ala Pro Tyr Gln Lys
 10 15 20

agc gtt aaa cta aag gtt cta gag aag gga ctt tac gaa atg gaa aga 752
 Ser Val Lys Leu Lys Val Leu Glu Lys Gly Leu Tyr Glu Met Glu Arg
 25 30 35

gat gaa aaa ggt tac ttc acc att acc tta aac aac gta aag gtt aga 800
 Asp Glu Lys Gly Tyr Phe Thr Ile Thr Leu Asn Asn Val Lys Val Arg
 40 45 50

gat agg tat aaa tac gtt tta gat gat gct agt gaa ata cca gat cca 848
 Asp Arg Tyr Lys Tyr Val Leu Asp Asp Ala Ser Glu Ile Pro Asp Pro
 55 60 65 70

gca tcc aga tac caa cca gaa ggt gta cat ggg cct tca caa att ata 896
 Ala Ser Arg Tyr Gln Pro Glu Gly Val His Gly Pro Ser Gln Ile Ile
 75 80 85

caa gaa agt aaa gag ttc aac aac gag act ttt ctg aag aaa gag gac 944
 Gln Glu Ser Lys Glu Phe Asn Asn Glu Thr Phe Leu Lys Lys Glu Asp
 90 95 100

ttg ata att tat gaa ata cac gtg ggg act ttc act cca gag gga acg 992
 Leu Ile Ile Tyr Glu Ile His Val Gly Thr Phe Thr Pro Glu Gly Thr
 105 110 115

ttt gag gga gtg ata agg aaa ctt gac tac tta aag gat ttg gga att 1040
 Phe Glu Gly Val Ile Arg Lys Leu Asp Tyr Leu Lys Asp Leu Gly Ile
 120 125 130

acg gca ata gag ata atg cca ata gct caa ttt cct ggg aaa agg gat 1088
 Thr Ala Ile Glu Ile Met Pro Ile Ala Gln Phe Pro Gly Lys Arg Asp
 135 140 145 150

tgg ggt tat gat gga gtt tat tta tat gca gta cag aac tct tac gga 1136
 Trp Gly Tyr Asp Gly Val Tyr Leu Tyr Ala Val Gln Asn Ser Tyr Gly
 155 160 165

ggg cca gaa ggt ttt aga aag tta gtt gat gaa gcg cac aag aaa ggt 1184
 Gly Pro Glu Gly Phe Arg Lys Leu Val Asp Glu Ala His Lys Lys Gly
 170 175 180

tta gga gtt att tta gac gta gta tac aac cac gtt gga cca gag gga 1232
 Leu Gly Val Ile Leu Asp Val Val Tyr Asn His Val Gly Pro Glu Gly
 185 190 195

aac tat atg gtt aaa ttg ggg cca tat ttc tca cag aaa tac aaa acg 1280
 Asn Tyr Met Val Lys Leu Gly Pro Tyr Phe Ser Gln Lys Tyr Lys Thr
 200 205 210

cca tgg gga tta acc ttt aac ttt gac gat gct gaa agc gat gag gtt	1328
Pro Trp Gly Leu Thr Phe Asn Phe Asp Asp Ala Glu Ser Asp Glu Val	
215 220 225 230	
agg aag ttc atc tta gaa aac gtt gag tac tgg att aag gaa tat aac	1376
Arg Lys Phe Ile Leu Glu Asn Val Glu Tyr Trp Ile Lys Glu Tyr Asn	
235 240 245	
gtt gat ggg ttt aga tta gat gcg gtt cat gca att att gac act tct	1424
Val Asp Gly Phe Arg Leu Asp Ala Val His Ala Ile Ile Asp Thr Ser	
250 255 260	
cct aag cac atc ttg gag gaa ata gct gac gtt gtg cat aag tat aat	1472
Pro Lys His Ile Leu Glu Glu Ile Ala Asp Val Val His Lys Tyr Asn	
265 270 275	
agg att gtc ata gcc gaa agt gat tta aac gat cct aga gtc gtt aat	1520
Arg Ile Val Ile Ala Glu Ser Asp Leu Asn Asp Pro Arg Val Val Asn	
280 285 290	
ccc aag gaa aag tgt gga tat aat att gat gct caa tgg gtt gac gat	1568
Pro Lys Glu Lys Cys Gly Tyr Asn Ile Asp Ala Gln Trp Val Asp Asp	
295 300 305 310	
ttc cat cat tct att cac gct tac tta act ggt gag agg caa ggc tat	1616
Phe His His Ser Ile His Ala Tyr Leu Thr Gly Glu Arg Gln Gly Tyr	
315 320 325	
tat acg gat ttc ggt aac ctt gac gat ata gtt aaa tcg tat aag gac	1664
Tyr Thr Asp Phe Gly Asn Leu Asp Asp Ile Val Lys Ser Tyr Lys Asp	
330 335 340	
gtt ttc gta tat gat ggt aag tac tcc aat ttt aga aga aaa act cac	1712
Val Phe Val Tyr Asp Gly Lys Tyr Ser Asn Phe Arg Arg Lys Thr His	
345 350 355	
gga gaa cca gtt ggt gaa cta gac gga tgc aat ttc gta gtt tat ata	1760
Gly Glu Pro Val Gly Glu Leu Asp Gly Cys Asn Phe Val Val Tyr Ile	
360 365 370	
caa aat cac gat caa gtc gga aat aga ggc aaa ggt gaa aga ata att	1808
Gln Asn His Asp Gln Val Gly Asn Arg Gly Lys Glu Arg Ile Ile	
375 380 385 390	
aaa tta gtc gat agg gaa agc tac aag atc gct gca gcc ctt tac ctt	1856
Lys Leu Val Asp Arg Glu Ser Tyr Lys Ile Ala Ala Leu Tyr Leu	
395 400 405	
ctt tcc ccc tat att cca atg att ttc atg gga gag gaa tac ggt gag	1904
Leu Ser Pro Tyr Ile Pro Met Ile Phe Met Gly Glu Glu Tyr Gly Glu	
410 415 420	
gaa aat ccc ttt tat ttc ttt tct gat ttt tca gat tca aaa ctg ata	1952
Glu Asn Pro Phe Tyr Phe Phe Ser Asp Phe Ser Asp Ser Lys Leu Ile	
425 430 435	

caa ggt gta agg gaa ggg aga aaa aag gaa aac ggg caa gat act gac	400	445	450	2000
Gln Gly Val Arg Glu Gly Arg Lys Lys Glu Asn Gly Gln Asp Thr Asp				
440	445	450		
cct caa gat gaa tca act ttt aac gct tcc aaa ctg agt tgg aag att	455	460	465	2048
Pro Gln Asp Glu Ser Thr Phe Asn Ala Ser Lys Leu Ser Trp Lys Ile				
455	460	465	470	
gac gag gaa atc ttt tca ttt tac aag att tta ata aaa atg aga aag	475	480	485	2096
Asp Glu Glu Ile Phe Ser Phe Tyr Lys Ile Leu Ile Lys Met Arg Lys				
475	480	485		
gag ttg agc ata gcg tgt gat agg aga gta aac gtc gtg aat ggc gaa	490	495	500	2144
Glu Leu Ser Ile Ala Cys Asp Arg Arg Val Asn Val Val Asn Gly Glu				
490	495	500		
aat tgg ttg atc atc aag gga aga gaa tac ttt tca ctc tac gtt ttc	505	510	515	2192
Asn Trp Leu Ile Ile Lys Gly Arg Glu Tyr Phe Ser Leu Tyr Val Phe				
505	510	515		
tct aaa tca tct att gaa gtt aag tac agt gga act tta ctt ttg tcc	520	525	530	2240
Ser Lys Ser Ser Ile Glu Val Lys Tyr Ser Gly Thr Leu Leu Leu Ser				
520	525	530		
tca aat aat tca ttc cct cag cat att gaa gaa ggt aaa tat gag ttt	535	540	545	2288
Ser Asn Asn Ser Phe Pro Gln His Ile Glu Gly Lys Tyr Glu Phe				
535	540	545	550	
gat aag gga ttt gct tta tat aaa ctt taggacagga gagttaaaaa	555			2335
Asp Lys Gly Phe Ala Leu Tyr Lys Leu				
555				
atttctatga atgattatac tttagatgat gagtaaaagc aagatcgatg aggaagagaa	560	565	570	2395
aaggagaaga gaagaagtca aaaagttagt aatgctctta gcaatgttaa gataatgttt	575	580	585	2455
ttttaaactc aaataataat aaataccatc atgtcaatat tcttcagaac tagagataga	590	595	600	2515
cctttacgtc ccggagatcc gtatccatta gttcaaatt ggatagaaga tgaggatggc	605	610	615	2575
gtaaaatttt cttgttctc agagaatgca gacaaagtgg agttgattct ttattcaca	620	625	630	2635
acaaatcaaa agtatccaaa ggagataata gaggttaaga atagaacggg ggatcc	635	640	645	2691
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<213> Sulfolobus solfataricus				
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Ala Pro Tyr Gln Lys Ser Val Lys Leu Lys Val Leu Glu Lys Gly Leu				
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Tyr Glu Met Glu Arg Asp Glu Lys Gly Tyr Phe Thr Ile Thr Leu Asn
 35 40 45

Asn Val Lys Val Arg Asp Arg Tyr Lys Tyr Val Leu Asp Asp Ala Ser
 50 55 60

Glu Ile Pro Asp Pro Ala Ser Arg Tyr Gln Pro Glu Gly Val His Gly
 65 70 75 80

Pro Ser Gln Ile Ile Gln Glu Ser Lys Glu Phe Asn Asn Glu Thr Phe
 85 90 95

Leu Lys Lys Glu Asp Leu Ile Ile Tyr Glu Ile His Val Gly Thr Phe
 100 105 110

Thr Pro Glu Gly Thr Phe Glu Gly Val Ile Arg Lys Leu Asp Tyr Leu
 115 120 125

Lys Asp Leu Gly Ile Thr Ala Ile Glu Ile Met Pro Ile Ala Gln Phe
 130 135 140

Pro Gly Lys Arg Asp Trp Gly Tyr Asp Gly Val Tyr Leu Tyr Ala Val
 145 150 155 160

Gln Asn Ser Tyr Gly Gly Pro Glu Gly Phe Arg Lys Leu Val Asp Glu
 165 170 175

Ala His Lys Lys Gly Leu Gly Val Ile Leu Asp Val Val Tyr Asn His
 180 185 190

Val Gly Pro Glu Gly Asn Tyr Met Val Lys Leu Gly Pro Tyr Phe Ser
 195 200 205

Gln Lys Tyr Lys Thr Pro Trp Gly Leu Thr Phe Asn Phe Asp Asp Ala
 210 215 220

Glu Ser Asp Glu Val Arg Lys Phe Ile Leu Glu Asn Val Glu Tyr Trp
 225 230 235 240

Ile Lys Glu Tyr Asn Val Asp Gly Phe Arg Leu Asp Ala Val His Ala
 245 250 255

Ile Ile Asp Thr Ser Pro Lys His Ile Leu Glu Glu Ile Ala Asp Val
 260 265 270

Val His Lys Tyr Asn Arg Ile Val Ile Ala Glu Ser Asp Leu Asn Asp
 275 280 285

Pro Arg Val Val Asn Pro Lys Glu Lys Cys Gly Tyr Asn Ile Asp Ala
 290 295 300

Gln Trp Val Asp Asp Phe His His Ser Ile His Ala Tyr Leu Thr Gly
 305 310 315 320

Glu Arg Gln Gly Tyr Tyr Thr Asp Phe Gly Asn Leu Asp Asp Ile Val
 325 330 335

Lys Ser Tyr Lys Asp Val Phe Val Tyr Asp Gly Lys Tyr Ser Asn Phe
 340 345 350

Arg Arg Lys Thr His Gly Glu Pro Val Gly Glu Leu Asp Gly Cys Asn
 355 360 365

Phe Val Val Tyr Ile Gln Asn His Asp Gln Val Gly Asn Arg Gly Lys
 370 375 380

Gly Glu Arg Ile Ile Lys Leu Val Asp Arg Glu Ser Tyr Lys Ile Ala
 385 390 395 400

Ala Ala Leu Tyr Leu Leu Ser Pro Tyr Ile Pro Met Ile Phe Met Gly
 405 410 415

Glu Glu Tyr Gly Glu Glu Asn Pro Phe Tyr Phe Ser Asp Phe Ser
 420 425 430

Asp Ser Lys Leu Ile Gln Gly Val Arg Glu Gly Arg Lys Lys Glu Asn
 435 440 445

Gly Gln Asp Thr Asp Pro Gln Asp Glu Ser Thr Phe Asn Ala Ser Lys
 450 455 460

Leu Ser Trp Lys Ile Asp Glu Glu Ile Phe Ser Phe Tyr Lys Ile Leu
 465 470 475 480

Ile Lys Met Arg Lys Glu Leu Ser Ile Ala Cys Asp Arg Arg Val Asn
 485 490 495

Val Val Asn Gly Glu Asn Trp Leu Ile Ile Lys Gly Arg Glu Tyr Phe
 500 505 510

Ser Leu Tyr Val Phe Ser Lys Ser Ser Ile Glu Val Lys Tyr Ser Gly
 515 520 525

Thr Leu Leu Leu Ser Ser Asn Asn Ser Phe Pro Gln His Ile Glu Glu
 530 535 540

Gly Lys Tyr Glu Phe Asp Lys Gly Phe Ala Leu Tyr Lys Leu
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<210> 7

<211> 3600

<212> DNA

<213> *Sulfolobus acidocaldarius*

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<221> CDS

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gcactaactc cgagctccgc gagtttagta gtcacgaatt tgcgtacata tttcgccgct 180
 atcccttct catgcaataa attcttcgct tagttgtacg ttatatcagt ctttagctata 240
 gacgaaatgt gaaaagacata gaacacttc tttggccctc tagtccagtt gagcgtgtat 300
 acgtagaagc cgtcctctt cacgttgc tttcgatcat actcattgag aacctttaca 360
 gcctccctaa gccttataacc gctctcaagg aggagcttga agactagctc tacctcaata 420
 cctcttaacag cctccaacca cctccctatc tcgtcagctc ctggaacctt aagatcaaca 480
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 ataactcaac aataataaga atttaatcag ttctgataag tatttcact cgaaaacatt 1140
 taaatatatt aagacataat ttcttattaa acagc atg ttt tcg ttc ggt gga 1193
 Met Phe Ser Phe Gly Gly
 1 5
 aat att gaa aaa aat aaa ggt atc ttt aag tta tgg gca cct tat gtt 1241
 Asn Ile Glu Lys Asn Lys Gly Ile Phe Lys Leu Trp Ala Pro Tyr Val
 10 15 20
 aat agt gtt aag ctg aag tta agc aaa aaa ctt att cca atg gaa aaa 1289
 Asn Ser Val Lys Leu Lys Leu Ser Lys Lys Leu Ile Pro Met Glu Lys
 25 30 35
 aac gat gag gga ttt ttc gaa gta gaa ata gac gat atc gag gaa aat 1337
 Asn Asp Glu Gly Phe Phe Glu Val Glu Ile Asp Asp Ile Glu Glu Asn
 40 45 50
 tta acc tat tct tat att ata gaa gat aag aga gag ata cct gat ccc 1385
 Leu Thr Tyr Ser Tyr Ile Ile Glu Asp Lys Arg Glu Ile Pro Asp Pro
 55 60 65 70
 gca tca cga tat caa cct tta gga gtt cat gac aaa tca caa ctt ata 1433
 Ala Ser Arg Tyr Gln Pro Leu Gly Val His Asp Lys Ser Gln Leu Ile
 75 80 85

aga aca gat tat cag att ctt gac ctt gga aaa gta aaa ata gaa gat		1481	
Arg Thr Asp Tyr Gln Ile Leu Asp Leu Gly Lys Val Lys Ile Glu Asp			
90	95	100	
cta ata ata tat gaa ctc cac gtt ggt act ttt tcc caa gaa gga aat		1529	
Leu Ile Ile Tyr Glu Leu His Val Gly Thr Phe Ser Gln Glu Gly Asn			
105	110	115	
ttc aaa gga gta ata gaa aag tta gat tac ctc aag gat cta gga atc		1577	
Phe Lys Gly Val Ile Glu Lys Leu Asp Tyr Leu Lys Asp Leu Gly Ile			
120	125	130	
aca gga att gaa ctg atg cct gtg gca caa ttt cca ggg aat aga gat		1625	
Thr Gly Ile Glu Leu Met Pro Val Ala Gln Phe Pro Gly Asn Arg Asp			
135	140	145	150
tgg gga tac gat ggt gtt ttt cta tac gca gtt caa aat act tat ggc		1673	
Trp Gly Tyr Asp Gly Val Phe Leu Tyr Ala Val Gln Asn Thr Tyr Gly			
155	160	165	
gga cca tgg gaa ttg gct aag cta gta aac gag gca cat aaa agg gga		1721	
Gly Pro Trp Glu Leu Ala Lys Leu Val Asn Glu Ala His Lys Arg Gly			
170	175	180	
ata gcc gta att ttg gat gtt gta tat aat cat ata ggt cct gag gga		1769	
Ile Ala Val Ile Leu Asp Val Val Tyr Asn His Ile Gly Pro Glu Gly			
185	190	195	
aat tac ctt tta gga tta ggt cct tat ttt tca gac aga tat aaa act		1817	
Asn Tyr Leu Leu Gly Leu Gly Pro Tyr Phe Ser Asp Arg Tyr Lys Thr			
200	205	210	
cca tgg gga tta aca ttt aat ttt gat gat agg gga tgt gat caa gtt		1865	
Pro Trp Gly Leu Thr Phe Asn Phe Asp Asp Arg Gly Cys Asp Gln Val			
215	220	225	230
aga aaa ttc att tta gaa aat gtc gag tat tgg ttt aag acc ttt aaa		1913	
Arg Lys Phe Ile Leu Glu Asn Val Glu Tyr Trp Phe Lys Thr Phe Lys			
235	240	245	
atc gat ggt ctg aga ctg gat gca gtt cat gca att ttt gat aat tcg		1961	
Ile Asp Gly Leu Arg Leu Asp Ala Val His Ala Ile Phe Asp Asn Ser			
250	255	260	
cct aag cat atc ctc caa gag ata gct gaa aaa gcc cat caa tta gga		2009	
Pro Lys His Ile Leu Gln Glu Ile Ala Glu Lys Ala His Gln Leu Gly			
265	270	275	
aaa ttt gtt att gct gaa agt gat tta aat gat cca aaa ata gta aaa		2057	
Lys Phe Val Ile Ala Glu Ser Asp Leu Asn Asp Pro Lys Ile Val Lys			
280	285	290	
gat gat tgt gga tat aaa ata gat gct caa tgg gtt gac gat ttc cac		2105	
Asp Asp Cys Gly Tyr Lys Ile Asp Ala Gln Trp Val Asp Asp Phe His			
295	300	305	310

cac gca gtt cat gca ttc ata aca aaa gaa aaa gat tat tat tac cag		2153	
His Ala Val His Ala Phe Ile Thr Lys Glu Lys Asp Tyr Tyr Gln			
315	320	325	
gat ttt gga agg ata gaa gat ata gag aaa act ttt aaa gat gtt ttt		2201	
Asp Phe Gly Arg Ile Glu Asp Ile Glu Lys Thr Phe Lys Asp Val Phe			
330	335	340	
gtt tat gat gga aag tat tct aga tac aga gga aga act cat ggt gct		2249	
Val Tyr Asp Gly Lys Tyr Ser Arg Tyr Arg Gly Arg Thr His Gly Ala			
345	350	355	
cct gta ggt gat ctt cca cca cgt aaa ttt gta gtc ttc ata caa aat		2297	
Pro Val Gly Asp Leu Pro Pro Arg Lys Phe Val Val Phe Ile Gln Asn			
360	365	370	
cac gat caa gta gga aat aga gga aat ggg gaa aga ctt tcc ata tta		2345	
His Asp Gln Val Gly Asn Arg Gly Asn Gly Glu Arg Leu Ser Ile Leu			
375	380	385	390
acc gat aaa acg aca tac ctt atg gca gcc aca cta tat ata ctc tca		2393	
Thr Asp Lys Thr Tyr Leu Met Ala Ala Thr Leu Tyr Ile Leu Ser			
395	400	405	
ccg tat ata ccg cta ata ttt atg ggc gag gaa tat tat gag acg aat		2441	
Pro Tyr Ile Pro Leu Ile Phe Met Gly Glu Glu Tyr Tyr Glu Thr Asn			
410	415	420	
cct ttt ttc ttc ttc tct gat ttc tca gat ccc gta tta att aag ggt		2489	
Pro Phe Phe Phe Ser Asp Phe Ser Asp Pro Val Leu Ile Lys Gly			
425	430	435	
gtt aga gaa ggt aga cta aag gaa aat aat caa atg ata gat cca caa		2537	
Val Arg Glu Gly Arg Leu Lys Glu Asn Asn Gln Met Ile Asp Pro Gln			
440	445	450	
tct gag gaa gcg ttc tta aag agt aaa ctt tca tgg aaa att gat gag		2585	
Ser Glu Glu Ala Phe Leu Lys Ser Lys Leu Ser Trp Lys Ile Asp Glu			
455	460	465	470
gaa gtt tta gat tat tat aaa caa ctg ata aat atc aga aag aga tat		2633	
Glu Val Leu Asp Tyr Tyr Lys Gln Leu Ile Asn Ile Arg Lys Arg Tyr			
475	480	485	
aat aat tgt aaa agg gta aag gaa gtt agg aga gaa ggg aac tgt att		2681	
Asn Asn Cys Lys Arg Val Lys Glu Val Arg Arg Glu Gly Asn Cys Ile			
490	495	500	
act ttg atc atg gaa aaa ata gga ata att gca tcg ttt gat gat att		2729	
Thr Leu Ile Met Glu Lys Ile Gly Ile Ile Ala Ser Phe Asp Asp Ile			
505	510	515	
gta att aat tct aaa att aca ggt aat tta ctt ata ggc ata gga ttt		2777	
Val Ile Asn Ser Lys Ile Thr Gly Asn Leu Leu Ile Gly Ile Gly Phe			
520	525	530	

ccg aaa aaa ttg aaa aaa gat gaa tta att aag gtt aac aga ggt gtt	2825
Pro Lys Lys Leu Lys Lys Asp Glu Leu Ile Lys Val Asn Arg Gly Val	
535 540 545 550	550
ggg gta tat caa tta gaa tgaaagatcg accattaaag cctggtaac	2873
Gly Val Tyr Gln Leu Glu	
555	
cttatccttt agggcaact tggatagagg aagaagatgg agttaatttt gtactattct	2933
ctgagaaacgc cacaaggta gaactgttaa cgtactctca gactagacaa gatgagccaa	2993
agggaaataat agaacttaga cagagaaccg gagatctctg gcatgtttt gtacctgggt	3053
taagaccagg tcagttgtat gggcacaggg tgtatggtcc atataaacca gaggaagggt	3113
taaggtttaa tcctaataaaa gtactgatag atccttatgc aaaagctata aacggattat	3173
tactatggga tgattcggtc tttggatata aaattggaga tcagaaccag gatctcagtt	3233
tcgatgagag aaaagacgt aaatttatac ctaaagggt cataataat cttatgtt	3293
atgggagga cgagcatttc ttcttagaa gaaagataacc tttaaggat agtataattt	3353
atgagacaca tataaaagga ataactaaat taaggcaaga ttaccggag aacgttagag	3413
gcacttttt gggtagca tcagatacta tgattgatta cctaaaagat ttaggaatta	3473
caaccgttga gataatgcct attcagcaat ttgttagatga gagattcatt gtcgataaaag	3533
ggttaaagaa ctactgggt tacaatccga taaattttt ctctcctgaa tgtagataact	3593
caagctc	3600

<210> 8

<211> 556

<212> PRT

<213> *Sulfolobus acidocaldarius*

<400> 8

Met Phe Ser Phe Gly Gly Asn Ile Glu Lys Asn Lys Gly Ile Phe Lys	
1 5 10 15	

Leu Trp Ala Pro Tyr Val Asn Ser Val Lys Leu Lys Leu Ser Lys Lys	
20 25 30	

Leu Ile Pro Met Glu Lys Asn Asp Glu Gly Phe Phe Glu Val Glu Ile	
35 40 45	

Asp Asp Ile Glu Glu Asn Leu Thr Tyr Ser Tyr Ile Ile Glu Asp Lys	
50 55 60	

Arg Glu Ile Pro Asp Pro Ala Ser Arg Tyr Gln Pro Leu Gly Val His	
65 70 75 80	

Asp Lys Ser Gln Leu Ile Arg Thr Asp Tyr Gln Ile Leu Asp Leu Gly	
85 90 95	

Lys Val Lys Ile Glu Asp Leu Ile Ile Tyr Glu Leu His Val Gly Thr
 100 105 110
 Phe Ser Gln Glu Gly Asn Phe Lys Gly Val Ile Glu Lys Leu Asp Tyr
 115 120 125
 Leu Lys Asp Leu Gly Ile Thr Gly Ile Glu Leu Met Pro Val Ala Gln
 130 135 140
 Phe Pro Gly Asn Arg Asp Trp Gly Tyr Asp Gly Val Phe Leu Tyr Ala
 145 150 155 160
 Val Gln Asn Thr Tyr Gly Gly Pro Trp Glu Leu Ala Lys Leu Val Asn
 165 170 175
 Glu Ala His Lys Arg Gly Ile Ala Val Ile Leu Asp Val Val Tyr Asn
 180 185 190
 His Ile Gly Pro Glu Gly Asn Tyr Leu Leu Gly Leu Gly Pro Tyr Phe
 195 200 205
 Ser Asp Arg Tyr Lys Thr Pro Trp Gly Leu Thr Phe Asn Phe Asp Asp
 210 215 220
 Arg Gly Cys Asp Gln Val Arg Lys Phe Ile Leu Glu Asn Val Glu Tyr
 225 230 235 240
 Trp Phe Lys Thr Phe Lys Ile Asp Gly Leu Arg Leu Asp Ala Val His
 245 250 255
 Ala Ile Phe Asp Asn Ser Pro Lys His Ile Leu Gln Glu Ile Ala Glu
 260 265 270
 Lys Ala His Gln Leu Gly Lys Phe Val Ile Ala Glu Ser Asp Leu Asn
 275 280 285
 Asp Pro Lys Ile Val Lys Asp Asp Cys Gly Tyr Lys Ile Asp Ala Gln
 290 295 300
 Trp Val Asp Asp Phe His His Ala Val His Ala Phe Ile Thr Lys Glu
 305 310 315 320
 Lys Asp Tyr Tyr Gln Asp Phe Gly Arg Ile Glu Asp Ile Glu Lys
 325 330 335
 Thr Phe Lys Asp Val Phe Val Tyr Asp Gly Lys Tyr Ser Arg Tyr Arg
 340 345 350
 Gly Arg Thr His Gly Ala Pro Val Gly Asp Leu Pro Pro Arg Lys Phe
 355 360 365
 Val Val Phe Ile Gln Asn His Asp Gln Val Gly Asn Arg Gly Asn Gly
 370 375 380
 Glu Arg Leu Ser Ile Leu Thr Asp Lys Thr Tyr Leu Met Ala Ala
 385 390 395 400

Thr Leu Tyr Ile Leu Ser Pro Tyr Ile Pro Leu Ile Phe Met Gly Glu
 405 410 415

Glu Tyr Tyr Glu Thr Asn Pro Phe Phe Phe Ser Asp Phe Ser Asp
 420 425 430

Pro Val Leu Ile Lys Gly Val Arg Glu Gly Arg Leu Lys Glu Asn Asn
 435 440 445

Gln Met Ile Asp Pro Gln Ser Glu Glu Ala Phe Leu Lys Ser Lys Leu
 450 455 460

Ser Trp Lys Ile Asp Glu Glu Val Leu Asp Tyr Tyr Lys Gln Leu Ile
 465 470 475 480

Asn Ile Arg Lys Arg Tyr Asn Asn Cys Lys Arg Val Lys Glu Val Arg
 485 490 495

Arg Glu Gly Asn Cys Ile Thr Leu Ile Met Glu Lys Ile Gly Ile Ile
 500 505 510

Ala Ser Phe Asp Asp Ile Val Ile Asn Ser Lys Ile Thr Gly Asn Leu
 515 520 525

Leu Ile Gly Ile Gly Phe Pro Lys Lys Leu Lys Lys Asp Glu Leu Ile
 530 535 540

Lys Val Asn Arg Gly Val Gly Val Tyr Gln Leu Glu
 545 550 555

<210> 9
 <211> 6
 <212> PRT
 <213> *Sulfolobus solfataricus*

<400> 9
 Val Ile Arg Glu Ala Lys
 1 5

<210> 10
 <211> 6
 <212> PRT
 <213> *Sulfolobus solfataricus*

<400> 10
 Ile Ser Ile Arg Gln Lys
 1 5

<210> 11
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 <212> PRT
 <213> *Sulfolobus solfataricus*

<400> 11
Ile Ile Tyr Val Glu
1 5

<210> 12
<211> 5
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 12
Met Leu Tyr Val Lys
1 5

<210> 13
<211> 7
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 13
Ile Leu Ser Ile Asn Glu Lys
1 5

<210> 14
<211> 7
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 14
Val Val Ile Leu Thr Glu Lys
1 5

<210> 15
<211> 10
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 15
Asn Leu Glu Leu Ser Asp Pro Arg Val Lys
1 5 10

<210> 16
<211> 12
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 16
Met Ile Ile Gly Thr Tyr Arg Leu Gln Leu Asn Lys
1 5 10

<210> 17
<211> 9

<212> PRT

<213> *Sulfolobus solfataricus*

<400> 17

Val Ala Val Leu Phe Ser Pro Ile Val
1 5

<210> 18

<211> 11

<212> PRT

<213> *Sulfolobus solfataricus*

<400> 18

Ile Asn Ile Asp Glu Leu Ile Ile Gln Ser Lys
1 5 10

<210> 19

<211> 12

<212> PRT

<213> *Sulfolobus solfataricus*

<400> 19

Glu Leu Gly Val Ser His Leu Tyr Leu Ser Pro Ile
1 5 10

<210> 20

<211> 7

<212> PRT

<213> *Sulfolobus solfataricus*

<400> 20

Asp Glu Val Phe Arg Glu Ser
1 5

<210> 21

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<212> PRT

<213> *Sulfolobus solfataricus*

<400> 21

Asp Tyr Phe Lys
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<211> 7

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<213> *Sulfolobus solfataricus*

<400> 22

Asp Gly Leu Tyr Asn Pro Lys
1 5

<210> 23
<211> 8
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 23
Asp Ile Asn Gly Ile Arg Glu Cys
1 5

<210> 24
<211> 7
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 24
Asp Phe Glu Asn Phe Glu Lys
1 5

<210> 25
<211> 7
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 25
Asp Leu Leu Arg Pro Asn Ile
1 5

<210> 26
<211> 5
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 26
Asp Ile Ile Glu Asn
1 5

<210> 27
<211> 7
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 27
Asp Asn Ile Glu Tyr Arg Gly
1 5

<210> 28
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 28
ytcwckraaw acytcatc

18

<210> 29
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 29
gataayatwg artayagrgg

20

<210> 30
<211> 8
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 30
Arg Asn Pro Glu Ala Tyr Thr Lys
1 5

<210> 31
<211> 9
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 31
Asp His Val Phe Gln Glu Ser His Ser
1 5

<210> 32
<211> 8
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 32
Ile Thr Leu Asn Ala Thr Ser Thr
1 5

<210> 33
<211> 6
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 33
Ile Ile Ile Val Glu Lys
1 5

<210> 34
<211> 11

<212> PRT

<213> *Sulfolobus solfataricus*

<400> 34

Leu Gln Gln Tyr Met Pro Ala Val Tyr Ala Lys
1 5 10

<210> 35

<211> 5

<212> PRT

<213> *Sulfolobus solfataricus*

<400> 35

Asn Met Leu Glu Ser
1 5

<210> 36

<211> 13

<212> PRT

<213> *Sulfolobus solfataricus*

<400> 36

Lys Ile Ser Pro Asp Gln Phe His Val Phe Asn Gln Lys
1 5 10

<210> 37

<211> 8

<212> PRT

<213> *Sulfolobus solfataricus*

<400> 37

Gln Leu Ala Glu Asp Phe Leu Lys
1 5

<210> 38

<211> 10

<212> PRT

<213> *Sulfolobus solfataricus*

<400> 38

Lys Ile Leu Gly Phe Gln Glu Glu Leu Lys
1 5 10

<210> 39

<211> 10

<212> PRT

<213> *Sulfolobus solfataricus*

<400> 39

Ile Ser Val Leu Ser Glu Phe Pro Glu Glu
1 5 10

<210> 40
<211> 9
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 40
Leu Lys Leu Glu Glu Gly Ala Ile Tyr
1 5

<210> 41
<211> 8
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 41
Glu Val Gln Ile Asn Glu Leu Pro
1 5

<210> 42
<211> 5
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 42
Asp His Ser Arg Ile
1 5

<210> 43
<211> 6
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 43
Asp Leu Arg Tyr Tyr Lys
1 5

<210> 44
<211> 14
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 44
Asp Val Tyr Arg Thr Tyr Ala Asn Gln Ile Val Lys Glu Cys
1 5 10

<210> 45
<211> 10
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 45
Thr Phe Ala Tyr Lys Ile Asp Gly Asn Glu
1 5 10

<210> 46
<211> 7
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 46
Leu Gly Pro Tyr Phe Ser Gln
1 5

<210> 47
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<212> PRT
<213> *Sulfolobus solfataricus*

<400> 47
Asp Val Phe Val Tyr Asp Gly
1 5

<210> 48
<211> 19
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 48
Tyr Asn Arg Ile Val Ile Ala Glu Ser Asp Leu Asn Asp Pro Arg Val
1 5 10 15
Val Asn Pro

<210> 49
<211> 5
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 49
Leu Asp Tyr Leu Lys
1 5

<210> 50
<211> 17
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 50
Lys Arg Glu Ile Pro Asp Pro Ala Ser Arg Tyr Gln Pro Leu Gly Val
1 5 10 15

His

<210> 51
<211> 9
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 51
Lys Asp Val Phe Val Tyr Asp Gly Lys
1 5

<210> 52
<211> 9
<212> PRT
<213> *Sulfolobus solfataricus*.

<400> 52
His Ile Leu Gln Glu Ile Ala Glu Lys
1 5

<210> 53
<211> 10
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 53
Lys Leu Trp Ala Pro Tyr Val Asn Ser Val
1 5 10

<210> 54
<211> 7
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 54
Met Phe Ser Phe Gly Gly Asn
1 5

<210> 55
<211> 14
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 55
Asp Tyr Tyr Tyr Gln Asp Phe Gly Arg Ile Glu Asp Ile Glu
1 5 10

<210> 56
<211> 7
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 56
Lys Ile Asp Ala Gln Trp Val
1 5

<210> 57
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 57
agcwagkagm taycarcc

18

<210> 58
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 58
ytthccatcr tawacraawa catc

24

<210> 59
<211> 6
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 59
Asp Glu Phe Arg Glu Ser
1 5

<210> 60
<211> 7
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 60
Asp Asn Ile Glu Tyr Arg Gly
1 5

<210> 61
<211> 7
<212> PRT
<213> *Sulfolobus solfataricus*

<400> 61
Pro Ala Ser Arg Tyr Gln Pro
1 5

<210> 62

<211> 8

<212> PRT

<213> *Sulfolobus solfataricus*

<400> 62

Asp Val Phe Val Tyr Asp Gly Lys
1 5

<210> 63

<211> 559

<212> PRT

<213> *Sulfolobus solfataricus*

<400> 63

Met Thr Phe Ala Tyr Lys Ile Asp Gly Asn Glu Val Ile Phe Thr Leu
1 5 10 15Trp Ala Pro Tyr Gln Lys Ser Val Lys Leu Lys Val Leu Glu Lys Gly
20 25 30Leu Tyr Glu Met Glu Arg Asp Glu Lys Gly Tyr Phe Thr Ile Thr Leu
35 40 45Asn Asn Val Lys Val Arg Asp Arg Tyr Lys Tyr Val Leu Asp Asp Ala
50 55 60Ser Glu Ile Pro Asp Pro Ala Ser Arg Tyr Gln Pro Glu Gly Val His
65 70 75 80Gly Pro Ser Gln Ile Ile Gln Glu Ser Lys Glu Phe Asn Asn Glu Thr
85 90 95Phe Leu Lys Glu Asp Leu Ile Ile Tyr Glu Ile His Val Gly Thr
100 105 110Phe Thr Pro Glu Gly Thr Phe Glu Gly Val Ile Arg Lys Leu Asp Tyr
115 120 125Leu Lys Asp Leu Gly Ile Thr Ala Ile Glu Ile Met Pro Ile Ala Gln
130 135 140Phe Pro Gly Lys Arg Asp Trp Gly Tyr Asp Gly Val Tyr Leu Tyr Ala
145 150 155 160Val Gln Asn Ser Tyr Gly Gly Pro Glu Gly Phe Arg Lys Leu Val Asp
165 170 175Glu Ala His Lys Lys Gly Leu Gly Val Ile Leu Asp Val Val Tyr Asn
180 185 190His Val Gly Pro Glu Gly Asn Tyr Met Val Lys Leu Gly Pro Tyr Phe
195 200 205Ser Gln Lys Tyr Lys Thr Pro Trp Gly Leu Thr Phe Asn Phe Asp Asp
210 215 220

Ala Glu Ser Asp Glu Val Arg Lys Phe Ile Leu Glu Asn Val Glu Tyr
 225 230 235 240

Trp Ile Lys Glu Tyr Asn Val Asp Gly Phe Arg Leu Asp Ala Val His
 245 250 255

Ala Ile Ile Asp Thr Ser Pro Lys His Ile Leu Glu Glu Ile Ala Asp
 260 265 270

Val Val His Lys Tyr Asn Arg Ile Val Ile Ala Glu Ser Asp Leu Asn
 275 280 285

Asp Pro Arg Val Val Asn Pro Lys Glu Lys Cys Gly Tyr Asn Ile Asp
 290 295 300

Ala Gln Trp Val Asp Asp Phe His His Ser Ile His Ala Tyr Leu Thr
 305 310 315 320

Gly Glu Arg Gln Gly Tyr Tyr Asp Phe Gly Asn Leu Asp Asp Ile
 325 330 335

Val Lys Ser Tyr Lys Asp Val Phe Val Tyr Asp Gly Lys Tyr Ser Asn
 340 345 350

Phe Arg Arg Lys Thr His Gly Glu Pro Val Gly Glu Leu Asp Gly Cys
 355 360 365

Asn Phe Val Val Tyr Ile Gln Asn His Asp Gln Val Gly Asn Arg Gly
 370 375 380

Lys Gly Glu Arg Ile Ile Lys Leu Val Asp Arg Glu Ser Tyr Lys Ile
 385 390 395 400

Ala Ala Ala Leu Tyr Leu Leu Ser Pro Tyr Ile Pro Met Ile Phe Met
 405 410 415

Gly Glu Glu Tyr Gly Glu Glu Asn Pro Phe Tyr Phe Phe Ser Asp Phe
 420 425 430

Ser Asp Ser Lys Leu Ile Gln Gly Val Arg Glu Gly Arg Lys Lys Glu
 435 440 445

Asn Gly Gln Asp Thr Asp Pro Gln Asp Glu Ser Thr Phe Asn Ala Ser
 450 455 460

Lys Leu Ser Trp Lys Ile Asp Glu Glu Ile Phe Ser Phe Tyr Lys Ile
 465 470 475 480

Leu Ile Lys Met Arg Lys Glu Leu Ser Ile Ala Cys Asp Arg Arg Val
 485 490 495

Asn Val Val Asn Gly Glu Asn Trp Leu Ile Ile Lys Gly Arg Glu Tyr
 500 505 510

Phe Ser Leu Tyr Val Phe Ser Lys Ser Ser Ile Glu Val Lys Tyr Ser
 515 520 525

Gly Thr Leu Leu Leu Ser Ser Asn Asn Ser Phe Pro Gln His Ile Glu
530 535 540

Glu Gly Lys Tyr Glu Phe Asp Lys Gly Phe Ala Leu Tyr Lys Leu
545 550 555